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# The Supply Chain Management of the Consumer Electronics Industry in China:

## A Comparative Case Study of Three Transnational Companies*

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## Abstract

More and more companies in Consumer Electronics (CE) are sourcing a part or whole of their raw materials or productions in less-developed countries such as China. Actually, China's economic position in the world is becoming the global supplier and manufacturer. The transnational CE companies are taking advantage of comparative advantages.

The fast development of China in 2005 demonstrated China's ability of supply and manufacture. The 9.9% GDP growth continues "Sourcing in China started with low-tech products but it has evolved beyond that," says Jim Hemerling, a senior vice president in The Boston Consulting Group's Shanghai office. "Now, in addition to traditional products, another huge area is consumer electronics." [1, 2]

The upstream supply chain organization of CE industry is more complicated than before in China. Thus the transnational companies in CE industry are facing big challenges in supply chain management when they do business in China [3–6]. Although each company is trying its best to manage its supply chain, different companies adopted different strategies in their supply chain management practices. In this paper we describe three transnational company's cases in CE industry and compare their different strategies in supply chain management.

**Key Words:** supply chain model, supply chain management, consumer electronics industry

## 1. Case 1: Dell

As one of the world's largest PC manufacturers, Dell operates on a global basis. Globalization means challenges, changes and most importantly, opportunities for Dell. The opportunities come into two areas. The first is the global economic growth. The second area is to leverage the global resources to provide customers with great value.

China as a priority market and the fourth largest business globally, plays an incredibly important role. China has been Dell's third largest market in the world. There is tendency that China will surpass Japan as the second largest market for PCs within the next five years.

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Simultaneously, the abundance of materials and components supply also shows the potential of China, so Dell has to be aggressive.

Since 1995, Dell has been selling into China through a network of authorized distributors. There years later, Dell decided to open a direct sales and manufacturing center in Xiamen, one of the first four Special Economic Zones established in China. Initially, Dell adopted a strategy targeted at selling to corporations and educational institutes. By comparison with other foreign players in the market such as HP, IBM, and Compaq, which depended largely on resellers, Dell focused on leveraging the strengths of its direct sales model. Dell's strengths were its low inventory holding costs and the saving resulting from the elimination of middlemen.

After nearly 9 years in practice, China seems like to be a harsh place for the Dell direct-sales model. It's suffering low penetration of the Internet, even though there is a very high penetration of cell phone and distribution to the less-developed and interior of the country is truly challenging. The lack of channels is becoming the bottleneck of Dell's model. However, Dell still exerts to improve the performance in China and the result proves that. In 2005, Dell's business in China increased 40%. The notebook contributed 75% of the increase.

Although the most famous characteristic of Dell's supply chain management is its direct sales model, in the downstream of the supply chain, Dell's build-to-order production system also has proved to provide a definite competitive advantage over the standard manufacturing model. As customers become choosier and their taste for high-tech products and services become harder to predict, forecasting errors are multiplied. As demand growth slows, the cost of these errors rises exponentially. Furthermore, overstocks sit on the shelf much longer and steadily lose value. In today's market, nobody wants to pay full price for a technologically inferior, two-month-old PC. Thus, manufacturers have to cut prices and erode their margins. Dell's alternative to the standard industry model is its build-to-order production system. Customers can communicate their exact requirements to Dell, and have the configured PC delivered to them in less than a week. This build-to-order production system makes Dell able to operate on razor-thin inventories, roughly six days' supply versus 30-40 days' worth of inventory held by other players.

Dell knows well that their customers expect price, customization and quality[7]. However, the customization in Dell's build-to-order production system needs stronger support from the upstream of the supply chain, namely, parts and components suppliers.

Generally speaking, the upstream of a supply chain should be in a better situation than downstream. This is also Dell's case. In fact, Dell does even better in China than in USA because it's closer to the suppliers in Taiwan, Southeast Asia and China. It has consolidated its supply to the point where 80% of its spending is with 50 suppliers. In Asia specifically, Dell spends about $50 billion with suppliers, $16 billion in China alone today.

However, so long as the direct-sales system is established, the key factor to success in the market becomes its control in the upstream of supply chain. In order to process huge quantity of purchasing, Dell established Worldwide Procurement Office（WWPO）in Hong Kong, Shanghai, Taiwan and Shenzhen[1] to enhance supplier partnerships in China for procurement efficiencies throughout Dell facilities worldwide. Dell sources a wide variety of parts and components from China including enclosures, optical drivers, printed circuit boards, monitors, speakers, keyboards, mice and I/O devices. On January 3, 2006, Dell opened a second factory in Xiamen. The capacity of Dell computer in China will be doubled. Dell's PC component purchasing power will increase in China.

1 Shenzhen is another one of the first four Special Economic Zones established in China.

From a global view, Dell has its own way to manage its supply chain (Fig. 1). To support its direct sales model in the downstream of supply china, Dell must have its special management method for it's upstream of supply chain. Dell focuses on four major points: continuity of supply, e-business collaboration, low-cost manufacturing, and technology leadership[3]. Based on these four points, we summarize the characteristics of its purchasing and supplier management as follows.

1) **Strict standards.** Dell's detail standards for suppliers mainly contain the cost, delivery, technology, turnover rate, the support for global operation, and capability to make deal with Dell through Internet. It is not enough to achieve only one or two standards. Dell frames the "Supplier Score Card" to make suppliers support all the important goals. The Card shows the tolerance of flaws and many other aspects based on PPM measures. Dell refers to the Card to determine increasing or reducing the purchasing scale.

2) **Information sharing.** Dell created a particular website to display the information suppliers needed. For example, Dell could use the link in the website to contact with the chip producers in China to manage the order process and JIT delivery. Depending on the Internet, Dell could assure the continuity of supply. That means Dell will save more time to deal with issues about purchasing orders and components. In China, because of the deficiency of IT infrastructure[8], Dell only concentrates on developing relationship with companies who could support its direct-sales high efficiency.

3) **Joint managed inventory.** Dell cooperates with suppliers to control inventory. Dell comes to the top by its low material inventory and no finished product inventory. Suppliers

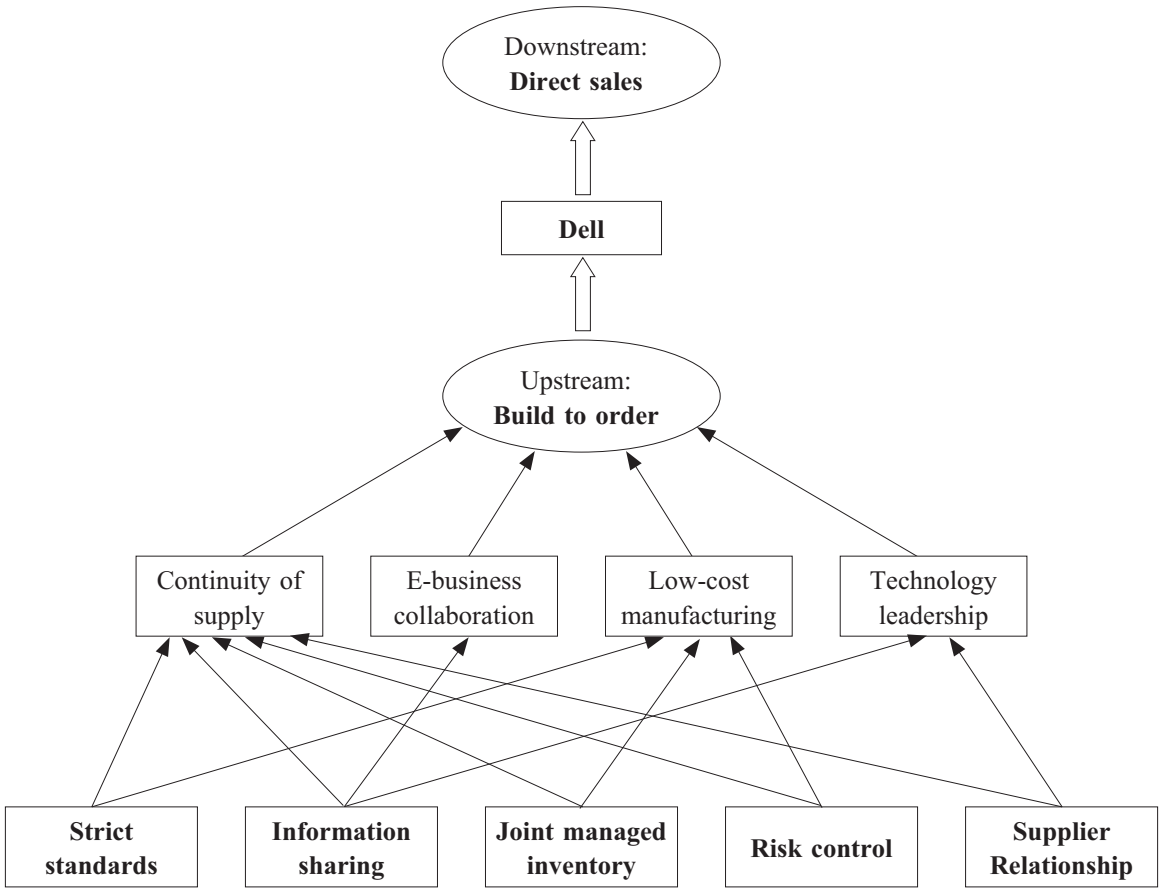


**Fig. 1 Dell's supply chain model: focus on the Upstream**

have the responsibility to keep two weeks buffer stock. Dell only keeps material for two hours. However, suppliers also obtain benefits. The large and continuous demand of Dell offset the disadvantage of JIT delivery.

4） **Risk control.** Dell focuses on controlling risk when making deal with suppliers in China. Sometimes suppliers could not adjust the supply capacity in time due to fast products and technology innovation or many other governmental, economic, and environmental problems. However, Dell's build-to-order model requires effective and efficient materials purchasing. Hence, Dell prepares many series of counter plans for emergency. For instance, in September 1998, after the earthquake of Taiwan, most of the sourcing of IT components was interrupted. However, Dell set up a special team to transfer the supply from Taiwan to mainland and other countries in a very short time. The practice was a success.

5） **Supplier Relationship.** Dell has generated basic principles for the relationships with suppliers.

— Do not produce all the components, but purchase them from the best suppliers.
— Keep simplicity. In Dell's eyes, the lower number of suppliers means that errors, cost and frustration lower, the coincidence is higher.
— Concentrate on the quality and capacity of suppliers, not the quantity of them.
— Bring suppliers into Dell's operation system. The close contact between upstream and downstream will steer to win-win performance.
— Keep close eye on efficiency of supply chain. Dell feeds back the goals, strategies and market information to supplier as soon as possible. This is not just for controlling the inventory, but for the consistency of supply and practice, avoiding the waste.
— Make the standard of supply in details. The suppliers not only have to abide these standards, but also make improvements continuously if they want to make deals with Dell for a long time.
— Do not only worship the benefit between Dell and suppliers. Dell hopes that the cooperation is happy and voluntary. This will make the whole supply chain into a well development cycle.

## 2. Case 2: Philips CE

Philips is a company whose head office is located in the Netherlands. It is active in the areas of medical systems, domestic appliance and personal care, consumer electronics, lighting and semiconductors. Philips Consumer Electronics（CE）is a part of whole company. In 2004, Philips CE contributed one third of whole company's sales.

Philips CE is a global leader in Connected Displays, Home Entertainment Networks and Mobile Infotainment respectively occupying 56％, 29％, and 10％ of the total sales of CE. The division's product range includes TV products such as Flat TV（LCD, Plasma）, conventional TV and projection TV; video products such as Home Theater in a Box（HTiB）, DVD, DVD＋RW, VCR and TV-VCR; audio systems, separates and portables; LCD and CRT computer monitors; mobile phones and cordless digital phones; set-top boxes; and accessories such as headphones and recordable media. Philips CE employs some 17,000 people worldwide.

Philips CE's supply chain model is quite different from Dell's. Philips CE's products are made to stock its upstream supply chain management with some special characteristics. Philips CE mainly purchases components from suppliers in the regions where assembly centers are located. The raw materials required to produce the components are directly acquired

by the respective suppliers, except for key components like cathode-ray tubes（CRT）, LCD panels and plastics.

The purchasing business in China is organized on global standards. The main purchasing department of Philips CE in mainland is situated in Philips Development and Creation Center（PDCC）, Shenzhen. The responsibilities are purchasing and supply chain processes of Home Entertainment Networks and Mobile Infotainment. Connected Display's purchasing is performed in Singapore.

Like Dell, Philips is also a global reviewer. So Philips CE obeys particular principles to do purchasing. In China, Philips CE divided its purchasing organization into six organic parts.

### 1. *Initial Purchasing（IP）Process*

The mission of IP is to contribute in achieving competitive target costing for BOM in the "Product Realization Process"（PCP）and manage supplier performance in all project milestones per business needs; to ensure on time material availability with the right quality to support PCP for assigned article package; to manager quality, delivery, and support cost performance for suppliers.

### 2. *OEM Purchasing Process*

The mission is to select OEM suppliers who have the ability to supply the required products in accordance with the customer demands and business strategy, contributing to the gross margin target of business, and manage OEM supplier overall performance per business needs.

### 3. *Strategic Purchasing Process*

The mission is to increase the innovation speed while assuring technology, quality, cost and availability of key components before Concept Start through a dedicated Business Group（BG）strategic purchasing function linked to our Supply Based Management Team（SBMT）function together with effective work flow between Strategic Purchasing and Site Initial Purchasing.

### 4. *Purchasing Project Process*

Project Purchasing mission is to serve the business, by facilitating purchasing and project team interaction, supporting the PCP（from Kick Off to First Mass Shipment phases[2]）with New and Specific Item list components preparation, handling purchasing related requests and driving target costing activities for the project team to achieve its goals.

### 5. *Supplier Quality Assurance Process*

The mission is to ensure the component quality consistently meeting our requirements and specifications. Supplier quality management addresses strategic activities directed at the identification of improvement opportunities and facilitation of the enhancement of suppliers' performance and capabilities.

### 6. *Mechanical & Tooling Purchasing Process*

The mission is to provide Philips CE China tools and processes that ensure the required capacity for production of plastic and metal parts at the right quality and at the lowest integral costs.

2 Kick Off to First Mass Shipment phases is the whole procedure of new products development.

Philips CE Purchasing has developed a series of survey tools as an aid to planning improvements in supply management, identifying the current level of maturity of the purchasing process, and to stimulate the sharing of best practice. The survey tool is in the first place a self-assessment model to score the own performance against world-class performance, but self-assessment scores may be shared in the future to learn from each other and to develop common improvement plans. In China, Philips CE established the assessment criteria following the World Class Excellence Strategic and Enabling Processes that have been developed by Dr. Robert Monczka et al[9] in which Philips and 200 other world-wide companies were actively involved (Fig. 2, Fig. 3).

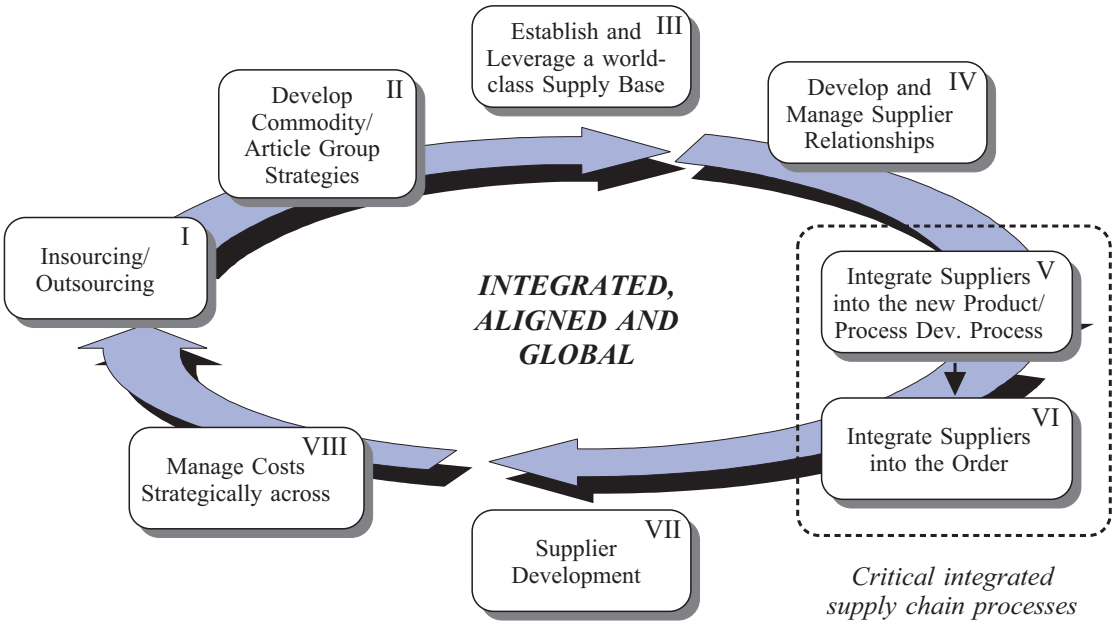


**Fig. 2 Purchasing and Supply Chain World-class Excellence Strategic Processes**

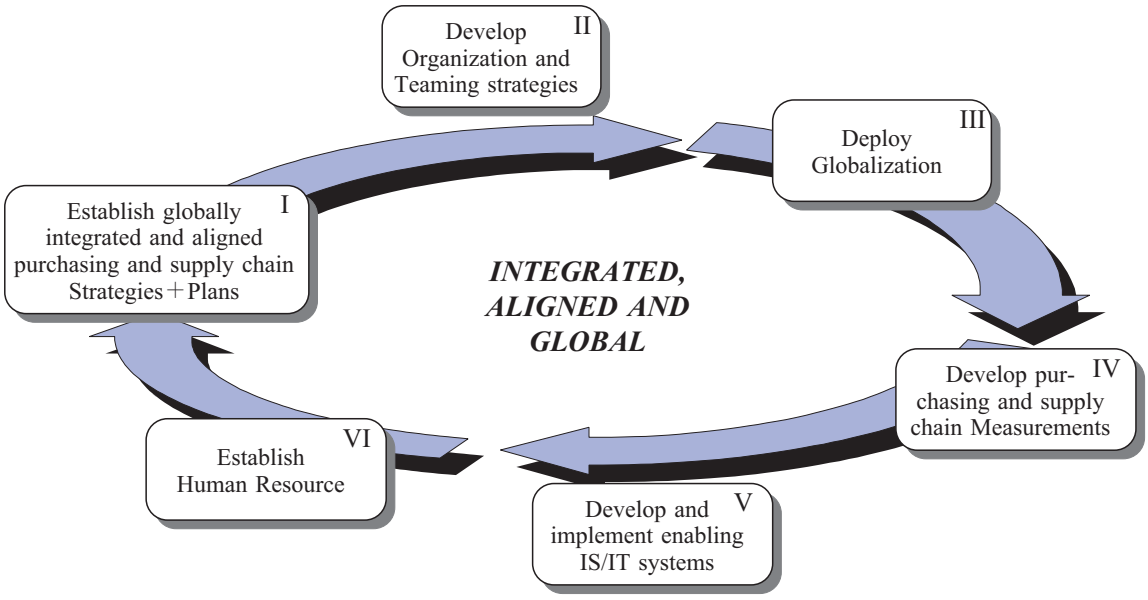


**Fig. 3 Purchasing and Supply Chain World-class Excellence Enablers**

In terms of 8 Strategic Processes and 6 Enablers, Philips CE uses those 14 elements scored on a ten-point scale. If any element of Philips CE purchasing and supply chain is scored as 10 points, it is the benchmark.

Furthermore, Philips CE's whole supply chain structure in China can be shown as Fig. 4 in which its purchasing and supplier management is in an important position. Based on these descriptions, we summarize the characteristics of Philips CE's purchasing and supplier management as follows.

1） **Classified materials management.** There are more than tens of thousands of SKU in the Philips CE's materials list, and Philips CE spends about $3.2 billion with suppliers in China. To manage materials purchasing, Philips CE developed "the materials portfolio" to analyze the importance and cost of certain materials. According to the relative cost and supply risk, all of materials are divided into four sections: Strategic, Leverage, Bottleneck, and Routine. Different control methods are further developed to the different kinds of materials.

2） **Sourcing strategies.** Philips CE ensures the purchasing department to buy the right items/components from the appropriate source with competitive price through detailed benchmarking and cost analysis. In order not to rely on one supplier only, it is normal practice for Philips to have a second source for the majority of components. In addition, this practice enables the acquisition of components at competitive market prices. In a limited number of cases there is a dependence on a single source of components due to a unique differentiating technology for product performance and/or cost. In such cases, Philips generally decides to enter into a partnership agreement in addition to supply agreements. In a number of cases, these partnerships are made with other Philips businesses（e.g. Philips Semiconductors and Philips Optical Storage）and（joint）ventures（like LG. Philips LCD and LG. Philips Displays）.

3） **Supplier measurement.** Philips CE measures suppliers' performance from five aspects including quality, delivery, cost, support & responsiveness and innovation. The measurements are made periodically and the measurement results are feedback to the suppliers and the suppliers' improvement measures are also required periodically. PDCA（Plan, Do, Check, Act）

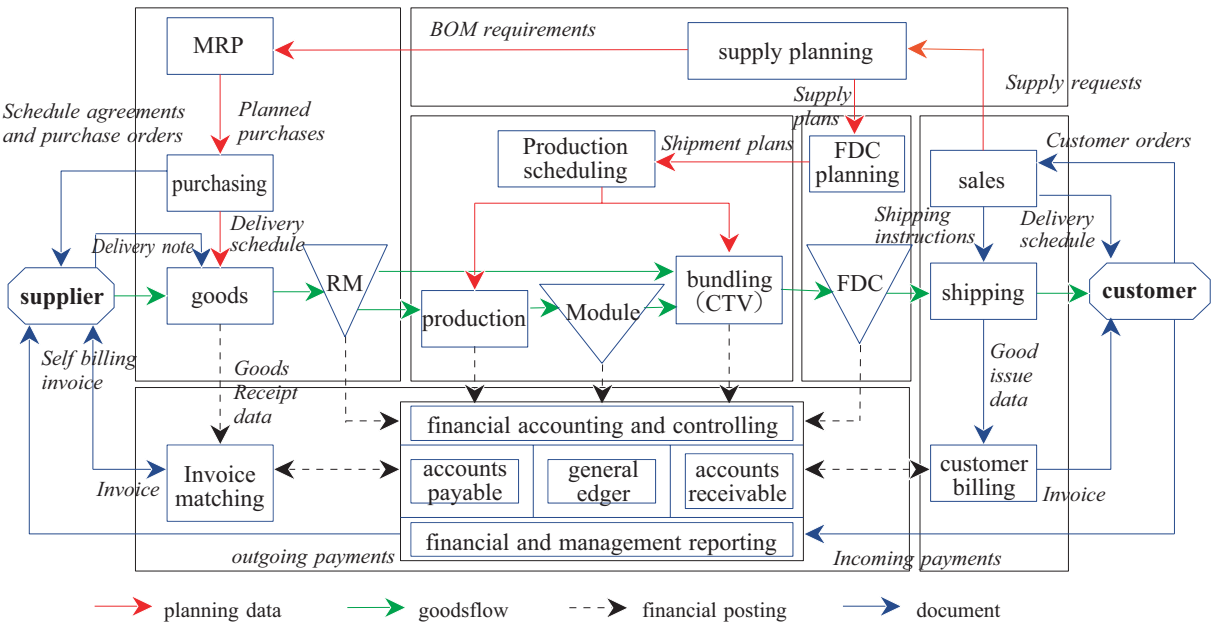


**Fig. 4 The process of whole operation in Philips CE in China**

cycle is introduced into this process.

**4） Vender managed inventory（VMI）.** Philips CE uses Strategic Cost Management to control the cost every component in Bill of Materials. For this purpose, Philips CE in China adopts VMI as a method of managing inventory. Based on the Philips CE's production planning information provided by Philips CE, Suppliers decide themselves when and how many materials should be send to Philips CE. The detailed principles are established to separate the responsibilities and ownerships of certain kinds of inventory. Furthermore, Philips CE subcontracts their logistics to 3PL[3] companies to reduce related cost.

## 3. Case 3: Toshiba

In 2006, Toshiba celebrates 131 years from the company's establishment, also 21 years of producing laptop PCs. The first laptop in the world market was born at this company and the brand was named as Dynabook which was permitted to use by Alan Kay. Today, more than half of PCs in the world are laptops, and the percentage will increase more in the coming age. Toshiba produces 5.5 million laptop PCs in a year and is ranked as third place in the world laptop market, after Dell and HPQ. However, another couple of PC manufacturers follow the third place and are expected to exceed the Toshiba's market share in the near future.

Although the company has a great tradition of manufacturing laptops,a new strategy should be necessary for the survival in the severe global competitions. Therefore, Toshiba has two strategies: differentiation strategy and commodity strategy. The former strategy is to create sate-of-the-art technologies which are considered to be the core competence of this company, such as developing the thinnest and lightest laptop and providing the most beautiful monitor display. The latter strategy is to keep up with the cost competitiveness. The company has contracts with some Taiwanese ODMs: Original Design Manufacturers which have assembling factories in Greater Shanghai. Since Toshiba still can provide reasonable priced PCs in the market, it is called their commodity strategy. Since this strategy is just for keeping Toshiba brand in the market, it does not seem to really go to the raison d'etre of the business.

Although it started the production of PCs at a factory in the suburb of Tokyo, most of production has already been transferred to China. A factory in Hangzhou, Zhejian Province has production capacity of 10,000 pieces per day for rather expensive priced laptops, while ODM factories in the Shanghai area produce lower priced PCs. As for shipping from Guizhou, 50％ is for the Japanese market, 30％ is for the US and 20％ is for Europe. For example, shipping for the US is transported from Hangzhou or Shanghai airports to Anchorage, Alaska. Then, from Anchorage: a hub airport for the American market, the products are delivered to each of the dealers in all over the US by Fedex and UPS.

The customers are divided into the following three categories: 1）dealers or big volume sales channels, 2）business customers buying by lots and 3）individual customers through the web page. Although the third category has not yet been matured at Toshiba, the other two categories can also be explained as Make-to-Order type production. Even if the dealers may retain some amount of product inventory in the distribution processes, for Toshiba the production is ordered by the customers. It is quite important to recognize how the difference between Dell and Toshiba in the production systems. Although the relations with the parts suppliers may be different, ways of the production seem to be the same. Dell says that it basically

3 3PL: The Third Party Logistics.

assemble the products by cell production system, however, even for Dell in case of big lot orders from business customers are not necessarily assembled by cell production system. Even at a Dell factory, they can assemble the product lots by short assembly lines ordered by business customers.

Toshiba is not simply a PC provider to customers, like Dell. Toshiba is a manufacturer which provides a wide variety of electric/electronics parts and products. Finding out the clear merit of doing PC business by such a general company today is quite important, because some companies which most of the human resources are allocated to the PC business have been successful. On the other hand, Toshiba's PC business is only a part of the whole company's business. However, they willingly utilize the variety of human resources of the whole company to their own PC products. This is the reason why not only they ask the outside venders to supply the parts from the VMI warehouse, but also they utilize their own parts manufacturing resources and so-called traditional type of "keiretsu" suppliers which have had long-term relations with Toshiba. Although the genuine "keiretsu" of past days does not exist any more today, some parts manufacturers still closely cooperate with each other, not only for the production but also for the new technology development. In other words, the raison d'etre of Toshiba is to develop the highest technical laptop in the world, giving the laptops which cannot be provided by any other PC manufacturers. If they cannot provide such top of the line PCs, they may loose the raison d'etre. Then, the policies to their suppliers become meaningless and the Dell method of purchasing will be seen as the best way. At this moment, there is no decisive answer to this question, the conclusion will be clarified in later years.

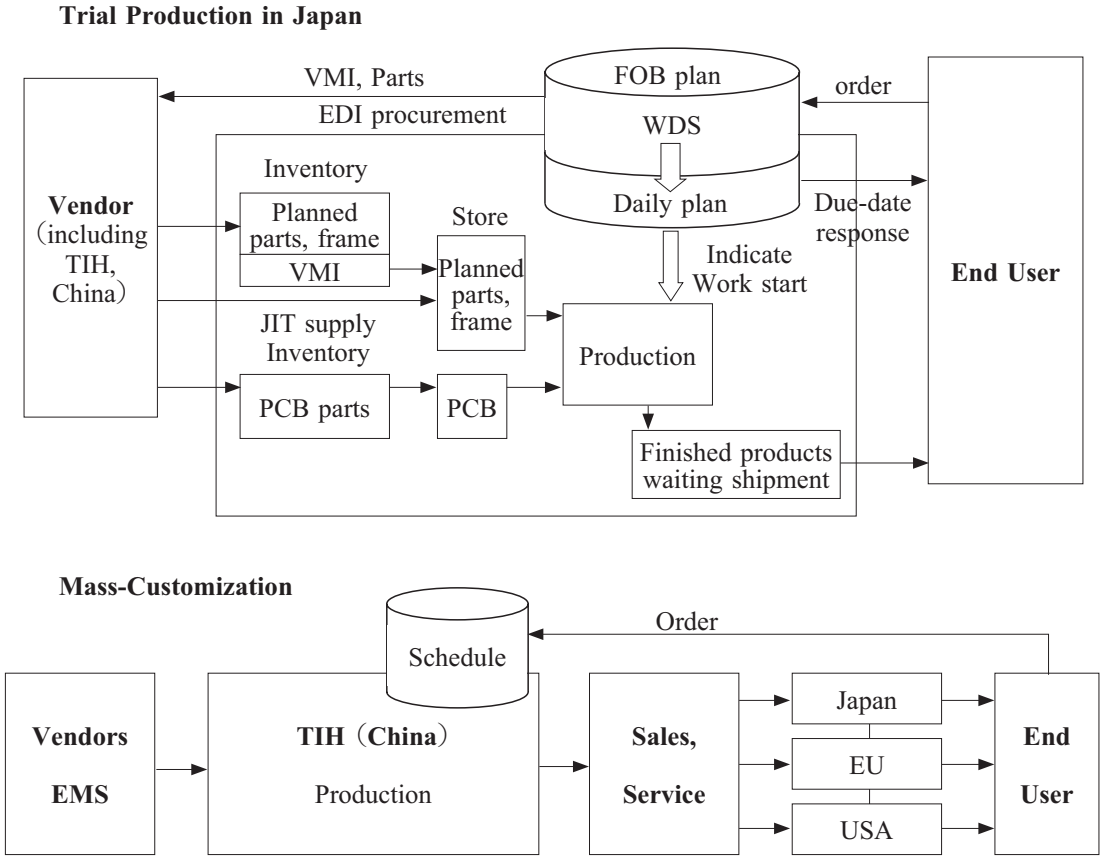


**Fig. 5 Toshiba's Production and SCM systems**[10]

# 4. Summary

Concerning the supply chain management of Consumer Electronics, all of the companies in this industry are trying their best. However, each company has its own characteristics in their management practice. We can see it from the above three cases. We summarize their similarities and differences in table 1.

**Table 1 The supply chain model comparison of three CE companies**

| | Dell | Philips CE | Toshiba |
|---|---|---|---|
| **Downstream of the supply chain** | Direct sales | Channel | Channel & Direct |
| **Upstream of the supply chain** | Build to Order | Build to Stock | Build to Stock<br>Build to Order |
| **Purchasing size in China in 2005** | US$ 16 billion | US$ 3.2 billion | US$ 6 billion |
| **Main points in supplier management** | −Continuity of supply<br>−E-business collaboration<br>−Low-cost manufacturing<br>−Technology leadership | −Quality<br>−Delivery<br>−Cost<br>−Support & Responsiveness<br>−Innovation | −Quality<br>−Cost<br>−Green purchasing = Environment friendly<br>−Long-term cooperation |
| **Management methods** | −Strict standards<br>−Information sharing<br>−Joint managed inventory<br>−Risk control<br>−Supplier relationship | −Classified materials management<br>−Sourcing strategies<br>−Supplier measurement<br>−Vender managed inventory | −Differentiation strategy and Commodity strategy<br>−Core competent technology<br>−Reduction of development lead-time |

We can see from the above table that first, these three companies have different business models. That is why they have different supply chain management models, especially in the upstream of the supply chain. For Dell, in order to support its build-to-order model, Dell has to emphasize continuity of supply and information sharing with suppliers; While for Philips CE, since they have more kinds of materials, they have to emphasize classified materials management and diversified sourcing strategies. Toshiba emphasizes environment friendly technology and long-term cooperation with the suppliers. There are also some similarities in these three companies' supply chain management practices. For example, all of them emphasize cost control and supplier relationship. These points are common points for not only companies in CE industry, but also companies in other industries. From this view of point, the management methods and excellent practice of these three companies could be greatly useful for other companies in both CE industry and other industries.

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